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Interpretive biases for ambiguous stimuli in social anxiety

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Abstract

A growing body of literature suggests that individuals with high levels of general anxiety form threatening interpretations of ambiguous events. Although theoretical formulations of pathological social anxiety emphasize the importance of a negative interpretive-style in the etiology and maintenance of the disorder, we are unaware of any study that documents this presumed phenomenon. To address this issue, we assessed for possible interpretive biases in a group of high and low socially-anxious students. The results indicated that socially-anxious subjects showed more threatening interpretations of ambiguous, interpersonal events when compared to the low-anxious participants. However, this bias was marked not so much by an outright negative interpretation style, but rather by a failure of the socially-anxious subjects to show a positive interpretation as was evinced by the low-anxious individuals. These group differences in interpretive style appeared to be influenced by trait aspects of social anxiety rather than differences in current mood state. No group differences emerged in interpretations of events that involved non-personal stimuli suggesting there is content specificity in the interpretive biases associated with social-anxiety. © 1999 Elsevier Science Ltd. All rights reserved.

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1. Introduction

Cognitive formulations of social phobia have emphasized the role of information processing biases in the etiology and maintenance of social anxiety (Beck & Emery, 1985; Clark & Wells,

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1995). Much of the research in this area has focused on attention (e.g. Hope et al., 1990) and memory biases (e.g. Rapee et al., 1994). However, socially-anxious individuals are presumed to draw negative inferences about ambiguous social events, resulting in increased anxiety and subsequent avoidance (Clark & Wells, 1995). In fact, a major component of cognitive-behavioral treatment of social phobia involves efforts to correct these biases (Hope & Heimberg, 1993).

Information processing biases, including interpretive biases, are thought to result from the activation of anxiety-related schema that facilitate processing of potentially threatening information (e.g. Beck & Emery, 1985). When faced with threat, false positives (seeing danger where none exists) are more acceptable than false negatives (missing cues denoting danger). Therefore, anxious individuals are likely to make false positive judgments, namely interpreting neutral or ambiguous cues as threatening. For socially-anxious individuals, the threat is social in nature and the possible consequences include humiliation, rejection, ouster from the group or isolation (Trower & Gilbert, 1990). Data from the Stroop paradigm (Hope et al., 1990; McNeil et al., 1995) have shown that socially-anxious individuals pay particular attention to social threat cues (words such as foolish and boring). It seems likely that as part of their efforts to avoid the negative consequences of social failure, socially-anxious individuals would also make false positive judgments, interpreting ambiguous social events as indicators of possible negative evaluation.

There is a growing body of literature showing that people with other anxiety disorders, such as panic disorder and generalized anxiety disorder (GAD), tend to make these false-positive judgments regarding threat vis-à-vis ambiguous information. Individuals with either panic disorder or GAD provided negative interpretations to ambiguous scenarios presented in a booklet (Butler & Mathews, 1983; McNally & Foa, 1987; Baptista et al., 1990). Agoraphobics provided negative interpretations of ambiguous sentence stems (Stoler & McNally, 1991). Other paradigms have yielded similar evidence of interpretive bias while ruling out competing hypotheses such as an overall negative response bias (e.g. Mathews et al., 1989; MacLeod & Cohen, 1993). Surprisingly, no similar studies have examined whether socially-anxious individuals also display a negative bias towards ambiguous information.

The primary purpose of the present study was to examine whether socially-anxious individuals display a negative interpretive bias towards ambiguous social information. Because of the importance of using ecologically valid paradigms when studying information processing biases (e.g. McNally, 1996), undergraduate students read a vignette describing a highly familiar situation, a 'blind' first date between two college students. Within the context of the story, multiple ambiguous statements were made with regard to both personal and non-personal evaluations. After reading the story, subjects were asked to formulate interpretations of these ambiguous events and to recall details of the story.

Ambiguous statements about both personal and non-personal events were included in an effort to identify the specificity of the interpretive bias. Although attentional biases tend to be content specific (Hope et al., 1990), there is mixed evidence as to whether interpretive biases are content specific as well. For example, Eysenck et al. (1991) found that persons with GAD who worried primarily about health concerns showed comparable interpretive biases when disambiguating either health-related or social-threatening sentences. However, test-anxious

students showed interpretive biases for ambiguous sentences involving ego-threat but not for sentences concerning physical threat (Calvo, Eysenck, & Castillo, 1997).

A second purpose of the study was to examine whether the interpretive bias would be enhanced for socially-anxious individuals by previous exposure to social threat information. Because the emotional Stroop task is known to activate attentional biases in vulnerable individuals (Hope et al., 1990; McNeil et al., 1995), it seems reasonable to assume that participation in an emotional Stroop task that included social threat words would increase the accessibility of information related to a negative interpretation of social events.

The following hypotheses were tested in the present study: (1) socially-anxious individuals will be more likely to provide a negative interpretation for ambiguous personal social information, but not ambiguous non-personal information, than nonanxious individuals. (2) The negative interpretive bias for social information will be enhanced by exposure to social threat stimuli for socially-anxious individuals but not for nonanxious individuals.

2. Method

2.1. Participants

248 undergraduates at the Illinois Institute of Technology and Elmhurst College completed the experimental procedures. The Interaction Anxiousness Scale (IAS; Leary, 1983) was used to identify a subset of subjects who experienced either very low or very high levels of social anxiety. This scale was chosen as our selection instrument as it focuses on discomfort in social situations and is not confounded by public speaking fears or avoidance behavior. Subjects who scored below the 20th percentile were considered to have low social-anxiety, while those scoring above the 80th percentile were considered to have high social-anxiety. The mean IAS score was not significantly different for men and women $t(256) = 0.61, p = 0.54$ and, therefore, an identical cutoff score was used for the two sexes. The 47 subjects (24 males and 23 females) in the low social-anxiety group had a mean IAS score of 26.94 (SD = 4.0) and the 47 subjects (21 males and 26 females) in the high social-anxiety group had a mean IAS score of 62.62 (SD = 3.58). There were no age differences between these two groups, $t(92) = 1.32, p = 0.19$, and the mean age for the entire sample of selected subjects was 20.02 (S.D. = 2.67).

2.2. Materials

2.2.1. Ambiguous social vignette and judgment questionnaire

Subjects read a vignette depicting a 'blind' date between two college-aged students. The description of the date contained information related to the couple's initial meeting, dining at a restaurant and attendance at a party. Included in the vignette were a number of ambiguous statements and behaviors concerning both interpersonal evaluation (e.g. When meeting her date, "Lisa said "You're certainly not what I expected."") and evaluation of non-personal stimuli (e.g. Upon entering the restaurant, "Lisa said "This is an unusual place.""). These evaluations could not clearly be disambiguated on the basis of other contextual information in

the story. Males and females received separate versions of the vignette that differed only in the sex of the protagonist and his or her date.

Immediately following the presentation of the ambiguous social vignette, subjects completed a 19-item questionnaire designed to assess their interpretation of events that were presented in the story. Items were developed to assess both the subjects' interpretation of ambiguous statements that related to interpersonal evaluation (interpersonal interpretation items, 5 items) and interpretation of ambiguous non-personal evaluations (non-personal interpretation items, 3 items). Interpersonal interpretation items required subjects to rate the degree they agreed with interpretations of ambiguous incidents that concerned the evaluation of another person. For example, subjects were asked to rate how strongly they agreed with the statement "When Lisa said to Steve, "You're certainly not what I expected", she was impressed". Non-personal interpretation items required subjects to rate how strongly they agreed with interpretations of ambiguous statements concerning the evaluations of non-personal objects (e.g. "Lisa had a positive first impression of the restaurant."). All ratings were made using a 7-point Likert scale anchored at each end by the descriptors 'strongly disagree' and 'strongly agree', and 'neutral' at the midpoint. Items that contained a negative interpretation were reverse scored so that scores greater than the scale midpoint (4) would reflect a positive interpretation of the ambiguous event. Mean scores were obtained for each item grouping.

To ensure the two social-anxiety groups had comparable levels of comprehension for the story, 7 items were included in the questionnaire that assessed accuracy of recall for non-emotional details (memory items). A multiple-choice format was used for the memory items, and a summation of correct responses served as a measure of recognition. The remaining items on the questionnaire were filler queries.

The ambiguous social vignette and judgment questionnaire were pilot tested on a group of 22, unselected undergraduates to assure that the intended ambiguous events were in fact perceived as ambiguous by the students. Perceived ambiguity would be reflected in ratings of approximately 4 (scale midpoint on 7-point scale) as this score would show subjects neither agreed nor disagreed with the interpretation of the event as presented in the item. The mean score for these items was 3.93 (S.D. = 1.07) indicating the events were perceived as ambiguous by the students.

2.2.2. Priming task

We attempted to prime schema related to social evaluation by requiring subjects to complete a Stroop task prior to reading the vignette. In this task, all subjects received two stimulus sets, a neutral set (lifted, fortified, process and practice) followed by a second set of either social-threat, social-positive or neutral words. Subjects were randomly assigned to the social-threat, social-positive and neutral priming conditions. Subjects in the social-threat condition were presented with socially-threatening words (lonely, criticize, foolish and shameful) in an attempt to activate schema related to social anxiety. The neutral condition included the presentation of neutral words (folded, rehearsal, project and sprouted) so that these subjects could serve as non-emotional comparisons. To ensure any possible differences in the social-threat group were not due merely to emotionality of the words, subjects in the social-positive condition were presented with positive-emotional, social words (loving, affection, helpful and friendly). Stimuli for the Stroop were adapted from Hope et al. (1990) and all words from the three categories

were matched in length and frequency. Each stimulus set involved presentation of words on a computer video-monitor, nine per line for eleven lines. Response time (RT) for completion of the set was collected to serve as a manipulation check for the priming task.

2.2.3. *Self-report questionnaires*

The IAS (Leary, 1983) was used as measure of social anxiety. This instrument is comprised of 15 statements each related to the degree of anxiety experienced in a variety of social encounters. Subjects rate on a 5-point scale how representative each statement is of their emotional response style, with higher scores reflecting greater levels of social anxiety.

The Revised Multiple Adjective Check List (MACL-R; Zuckerman & Lubin, 1985) was used to assess current mood state. The MACL-R is comprised of a 132 mood-related adjectives that are grouped into one of 7 emotional subscales. Subjects are instructed to circle those adjectives that best describe their current mood state. Of interest to this study were subscales reflecting the emotions of fear and sadness (anxiety, depression, and dysphoria) and these scores were combined to form a single measure of negative affect.

2.3. *Procedure*

All information was gathered in one experimental session. Subjects were informed that the purpose of the experiment was to form impressions of other people. Subjects were randomly assigned to one of the three priming conditions and after initially completing a MACL-R, they participated in the computerized Stroop task. Subjects read the ambiguous social vignette and completed the judgment questionnaire. The IAS and a second MACL-R were then administered as the last tasks of the experiment.

3. Results

3.1. *Preliminary analysis*

Gender was initially included as a between-subject factor in all analyses, but this variable failed to yield any significant main effects or interactions so we collapsed across gender in the reported analyses. To assure there were no group differences in comprehension of the vignette, the total number of correct memory items was entered into a 2 (Social-anxiety group: high anxious versus low anxious) \times 3 (prime condition: neutral, social-threat and social-positive) analysis of variance (ANOVA). In this analysis, there were no main effects or interactions (all p 's > 0.23) indicating the two social-anxiety groups had comparable levels of recognition for vignette details.

3.2. *Interpretive bias*

Mean scores for both interpersonal and non-personal interpretation items were entered into a repeated measures 2 \times 2 \times 3 multivariate analysis of variance (MANOVA) containing one within-subject variable, item-type (interpersonal versus non-personal), and two between-subject

Table 1
Correlations between judgment questionnaire scales and measures of state and trait social anxiety
($N = 94$)

	IAS	Current negative affect composite ^a
Social interpretation items	−0.26 ^b	−0.10
Non-social interpretation items	−0.02	−0.01
Memory items	0.19	−0.08

^a Summation of MACL-R subscales anxiety, depression and dysphoria. ^b $p < 0.01$.

variables, social-anxiety group (high versus low) and prime condition (social-threat versus social-positive versus neutral). Although no main effects emerged, we found an interaction between item-type and social-anxiety group, $F(2, 88) = 6.62$, $p = 0.012$. We followed this interaction with planned comparisons between the high-anxious and low-anxious groups for each type of item (interpersonal/non-personal). This follow-up analysis showed group differences only for the interpersonal interpretation items $t(92) = 2.34$, $p = 0.022$. Inspection of the group means indicated that socially-anxious subjects ($M = 4.58$, S.D. = 0.84) expressed more negative interpretations of ambiguous, interpersonal events than non-anxious subjects ($M = 5.01$, S.D. = 0.92). No differences were found items requiring disambiguation of non-personal events, $t(92) = 0.08$.

In follow-up analyses, we attempted to investigate whether these interpretive biases were a function of trait aspects of social anxiety or current, dysphoric mood state. A correlation matrix was formed between the IAS, the negative affect composite measure (obtained at the end the experimental session) and the interpersonal, non-personal, and memory items on the judgment questionnaire. As presented on Table 1, the IAS, but not current level of negative affect, was correlated with items requiring interpretation of ambiguous, interpersonal situations. There were no other significant correlations although the relationship between IAS and the memory items approached significance ($p = 0.07$).

To partial out any shared variance between current negative affect and the IAS, a regression equation was formed using the scores from the interpersonal interpretation items as the dependent measure. Current negative affect was entered in the first step of the equation followed by the IAS score on the second step. As shown in Table 2, removing the variance

Table 2
Summary of hierarchical regression analysis predicting scores on social interpretation items
($N = 94$)

Variable	<i>B</i>	S.E. <i>B</i>	β
<i>Step 1</i>			
Negative affect composite ^a	−0.02	0.02	−0.10
<i>Step 2</i>			
IAS	−0.01	0.01	−0.25 ^b

Step 1: $R^2 = 0.01$; $F(1, 92) < 1$; Step 2: $R^2 = 0.07$; $F(3, 58) = 2.94$, $p < 0.05$. ^aSummation of MACL-R subscales anxiety, depression and dysphoria. ^b $p = 0.01$.

Table 3
Mean response latencies^a by social-anxiety group, prime condition and stimulus set

Social-anxiety group	Prime condition	Stimulus set	
		stimulus set #1	stimulus set #2
Low social-anxiety	social threat	52.7 (8.3)	59.1(10.6)
	social positive	49.7 (10.3)	58.4 (12.1)
	neutral	50.2 (10.4)	55.7 (15.6)
High social-anxiety	social threat	58.6 (12.6)	62.9(12.5)
	social positive	55.7 (9.4)	63.6 (8.6)
	neutral	54.4 (5.7)	57.9 (5.1)

^a Response latencies are in seconds.() Standard deviations.

attributable to current negative affect did not significantly attenuate the relationship between the IAS and the interpersonal items.

We failed to find that priming condition influenced the subjects' responses on the judgment question. However, before discounting the Stroop task as a priming manipulation, we sought to establish the integrity of our priming manipulation by documenting Stroop interference effects with our sample. This manipulation check consisted of subjecting Stroop task RTs to a repeated measures MANOVA that included one within-subject factor (stimulus set: first set versus second set) and two between-subject factors (social-anxiety group and prime condition). We failed to find any support for our prediction that socially-anxious subjects would show slower RTs when exposed to the social-threat words as evidenced in the failure to find an interaction between stimulus set, social-anxiety group and prime condition, $F(2, 88) < 1$. The RT means for the Stroop task are presented in Table 3.

4. Discussion

Socially-anxious subjects showed more negative interpretations of ambiguous, interpersonal events when compared with non-anxious subjects. The groups failed to differ on items measuring interpretations of non-personal events or memory for the vignette. Failure to find group differences in interpretations of non-personal events indicates socially-anxious subjects did not uniformly rate all ambiguous events as more negative. This discrimination between personal and non-personal items suggests content specificity in the interpretation biases of socially-anxious subjects and rules out possible response bias explanations. The failure to find group differences on memory items suggests that interpretive biases are not due differences in recall of threatening material and is consistent with previous studies showing interpretive biases to be 'on-line' phenomena (MacLeod & Cohen, 1993; Calvo et al., 1997).

It is important to note that we found the interpretation style of the socially-anxious subjects to be negative only relative to the responses of the non-anxious group. For socially-anxious subjects, the mean rating for interpersonal items was 4.58, slightly higher than the mid-point of

the scale (4). A rating above the scale midpoint reflects a positive interpretation of the event. We can conclude, therefore, only that socially-anxious subjects had a less positive interpretation style than the non-anxious group. The failure to find an outright negative interpretation style might indicate that despite evidence from our pilot data there was a slight positive skew to the vignette making positive interpretations more likely and thereby inflating threatening interpretations made by the socially-anxious subjects. However, an alternate hypothesis is that socially-anxious individuals are characterized not by a propensity to negatively interpret ambiguous personal events, but rather by an interpretation style where they refrain from making automatic, positive judgments as is observed with well-adjusted individuals (Taylor & Brown, 1988).

Correlational and regression analyses were used to assess issues of state versus trait influences on interpretive biases. Current level of negative affect failed to correlate with ratings of the interpersonal items. Conversely, the IAS, a measure asking respondents to assess how certain descriptors are 'characteristic' of their behavior, had a significant relationship with these items. These findings argue that an interpretive bias in socially-anxious individuals is likely due to enduring cognitive characteristics rather than the sole effects of current mood state and are thus consistent with schema-based explanations of cognitive biases in social phobia.

We failed to find an interference effect in the Stroop task and, because of this failure, we must refrain from drawing conclusions regarding the use of the Stroop as a priming manipulation. Although we would predict otherwise, successful demonstration of an attentional bias effect might then lead to an enhancement of interpretive biases. It should be noted that as the intent of the Stroop was to serve a priming task, a number of experimental design features were changed from the typical Stroop administration (e.g. failure to counterbalance stimuli, initial administration of neutral stimuli to all subjects). Although these changes were working against finding an attentional bias effect for social-threat words, we believed it would enhance the Stroop task as a priming manipulation.

In sum, to investigate possible interpretation biases in socially-anxious college students, we used a research paradigm chosen for its presumed high levels of ecological validity, disambiguating events occurring on a 'blind' date. To our knowledge, our finding that socially-anxious subjects showed less positive interpretations of ambiguous, interpersonal events represents the first documentation of interpretation biases in socially-anxious subjects. Furthermore, as these biases did not extend to the interpretation of ambiguous, non-personal events, it appears these biases are specifically related to the disambiguation of social information.

An interesting feature of our design was that it allowed us to address whether the interpretation biases associated with social anxiety represent an outright negative interpretation style or rather a failure to positively interpret ambiguous events. Our data suggests non-clinical, socially-anxious students are marked by an attenuation of a positivity bias rather than a style of forming threatening interpretations. It remains unclear how this effect would compare with a group of social phobics presenting at a clinic for treatment. However, our findings might suggest that one function of cognitive therapy should be to not only decrease threatening interpretations in socially-anxious individuals but also to shape a positive interpretation bias.

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